ASRTU SPECIFICATION FOR ENAMEL, SYNTHETIC, EXTERIOR PAINT, GLOSSY AND MATT FINISH, AIR DRYING FOR USE ON PRIMED SURFACES OF MOTOR VEHICLES (PREMIUM QUALITY)

0.0 SPECIFICATION NO. : AS:256:87:OCT:2021

1.0 SCOPE :

1.1 This standard prescribes requirements and methods of test for the material commercially known as Enamel, synthetic, exterior Glossy and Matt finish paint, air drying for use on primed surface of motor vehicles and other equipment.

1.2 This is a purchase specification and does not include manufacturing details. The material supplied against this specification shall be compatible with the original equipment.

1.3 The supplier shall provide detail specifications to the purchasing/ inspecting authority whenever such information is specifically called for.

1.4 The material offered against this specification shall conform to this specification in full. The tests shall be carried out on the material or on the test specimen prepared from the material. If any of the samples fail in any one or more tests specified, the sample shall be considered as not having met the requirements of this specification.

1.5 It is the manufacturer's prime responsibility to satisfy the inspection authority that the commodity conforms to this standard. This may be accomplished by performing the tests specified in this standard.

1.6 Sample selection shall be the responsibility of the Quality Assurance Officer. Required quantity for complete testing as per this specification shall be supplied.

1.7 This specification supersedes earlier specifications including AS:256:72:JUN:2008.

2.0 APPLICATION:

2.1 The synthetic, enamel, exterior paints, Glossy and Matt finish (Premium Quality) meeting the requirements of this standard, shall be used for protection against corrosion and decoration of bus bodies.

3.0 REFERENCE STANDARDS:

i) IS 5:2007 (Reaffirmed 2017) Colours for Ready Mixed Paints and Enamels
ii) IS 101:1989 (Reaffirmed 2019) Methods of Sampling and Test for Paints, Varnishes and related products (more parts)
iii) IS 2932:2013 (Reaffirmed 2018) Enamel Synthetic, Exterior a) Undercoating, (b) Finishing Specifications

iv) IS 8662:2004 (Reaffirmed 2019) Enamel, synthetic, exterior (a) undercoating, (b) finishing for railway coaches

v) IS 9034:2018 Enamel, synthetic, exterior air drying, for use on primed surfaces of motor vehicles and other equipment.

vi) IS 6125:2017 Enamel, Synthetic, stoving for Automobile

vii) ASTM D6450 Standard method for Flash point by continuously closed cup method

viii) ASTM D4213 Method for wet scrubbing test

ix) SAE J 2527: 2004-02 Performance based standard for Accelerated exposure of Automotive Exterior Material using A Controlled Irradiance Xenon Arc apparatus.

x) RAL Colour Card

4.0 TEST QUANTITY:

Minimum 2 litre of enamel preferably in 1 litre capacity in tin containers with its undercoat ½ litre, Red oxide primer ½ litre and thinner ½ litre shall be supplied for testing.

5.0 GENERAL REQUIREMENTS:

5.1 The material shall be supplied in brushing consistency but shall be suitable for application by spraying after thinning with Petroleum Hydrocarbon Solvent, Grade 145/205, Low Aromatic, conforming to IS:1745:2018

5.2 The smell of the material shall not be objectionable during application.

5.3 **Composition** :

The material shall be based on synthetic alkyd resin. It shall be of such a composition that it satisfy the requirements of this standard. Rosin content shall not exceed 0.5%.

6.0 TEST METHOD & REQUIREMENTS:

6.1 Tests shall be conducted according to the test methods prescribed in various parts and sections of IS:101.
Reference to the various clauses of these standards are given in Col.4 of Table 1.

6.2 **Resistance to Acid**

A film of the material when tested as prescribed in Appendix `A' shall not show signs of disintegration or change of colour to a rating not less than 8 taking original colour as 10. The loss of gloss shall not be more than 50 percent of the original gloss.

6.3 **Resistance to Alkali**
A film of the material when tested as prescribed in Appendix `B' shall not show signs of disintegration or change of colour to a rating not less than 8 taking original colour as 10. The loss of gloss shall not be more than 50 percent of the original gloss.

6.4 **Accelerated Storage Stability Test**
A paint sample when tested as prescribed in Appendix `C' shall not gel, liver, curdle or change in efflux time by more than 20% and there shall be no evidence of seeding. The paint shall meet the drying time requirement and shall produce dry film that is uniform in appearance and free from streaking, mottling and seeding.

6.5 **Accelerated Weathering Test:**

6.5.1 The characteristics of a film of the material from the sample under test as prescribed in Appendix `D' tested in the accelerated weathering apparatus and for a period of 15 days (360 hrs) as per standard SAE J 2527: 2004-02 shall not deviate more than the limits specified in Table 2.

6.6 The material shall also comply with the requirements given in Table 1.

7.0 PACKING & MARKING:

7.1 **Packing**:
Shall be packed in metal container.

7.2 **Marking**:
Each container shall be marked with the following:

a) Name of the material with Specification No. according to which supplies are made and ISC Colour Code as per IS:5:2007 and paint spot on the top and bottom of the container.

b) Name and address of the manufacturer or Trade mark, if any;

c) Volume of the material;

d) Month and year of manufacture.

7.3 Marking and Packing being non-critical informative parameter to be recorded

TABLE -1

Sr. No.	Characteristic	Requirement	Method of Test Ref. to IS:101 of Clause
1	Mass in Kg per 10 litre, Min.	9.0	Part 1 Sec 7
2	Volume Solids, % Min.	35	Part 8 Sec 6
3	Flash point ° C Min.	30	Part 1 Sec 6
4	Drying time, Hrs. Max a) Surface dry b) Hard dry c) Tack free	 4 12 24	Part 3 Sec 1
5	Colour	Close match to the specified IS colour code of IS: 5	Part 4 Sec 2
6	a) Finish	Glossy finish: Smooth and glossy Matt finish: Smooth and matt	Part 3 Sec 4
	b) Gloss at 60°	Glossy finish: 85, Min. Matt finish: 30, Max.	Part 4 Sec 4
7	Scratch hardness after 48 hours air-drying	No such scratch as to show the bare metal, shall be observed at a load of 1500 gms	Part 5 Sec 2
8	Flexibility and adhesion	No visible damage or detachment of the film after 96 hrs. air drying followed by cooling for 5 hrs. at 0°C	Part 5 Sec 2
9	Resistance to Diesel	Shall pass the test	Part 7 Sec 2
10	Resistance to Corrosion	Shall pass the test	Part 6 Sec 1
11	Resistance to Acid	Shall pass the test	Appendix A
12	Resistance to Alkali	Shall pass the test	Appendix B
13	Accelerated Storage Stability Test at 60 ± 2°C for 96 Hrs	Shall pass the test	Appendix C
14	Accelerated Weathering Test	Shall pass the test	Appendix D

Appendix `A'

Test for Resistance to Acid

A-0 **Outline of the Method**

A test panel coated with the enamel after specified drying period, is immersed in a definite concentration of sulphuric acid for 24 Hrs. after which is washed, dried and observations are made for performance.

A-1 **Procedure**

Apply a coat of finishing enamel, as specified under 2.2 of IS:101 (Part 6 - Sec.1) on a 150 mm x 70 mm clean glass panel to give a dry film mass commensurate with the mass in Kg/10 Lit. of the material. Protect the edges of the panel by applying a coat of Wax. Allow the panel to air-dry in a horizontal position for 48 hrs. under specified drying conditions (See IS:101 (Part 1- Sec.3). Immerse the panel in a 2 percent (m/v) solution of concentrated sulphuric acid (relative density 1.84) for 24 hours at room temperature. Remove the panel, wash in running fresh water and allow to dry for an hour.

Appendix `B'

Test for Resistance to Alkali

B-0 **Outline of the Method**

The film of the material tested with a solution of laundry soap followed by a solution of sodium carbonate, washed, dried and observations are made for performance.

B-1 **Procedure**

Prepare the test panel as described in Appendix `A'. Immerse the panel in a one percent (m/v) solution of laundry soap for half an hour at temperature 27 to 30°C. Remove the panel and wash in running water, dry for an hour and examine the film and then subject it to test as prescribed under.

B-2 Immerse the panel in a 2 percent (m/v) solution of sodium carbonate of analytical regent grade for half an hour at a temperature 27 to 30°C. Remove the panel, wash in running water, dry for an hour and examine the film.

Appendix `C'

Accelerated Storage Stability Test

C-1 **Procedure**

Store the paint sample in a closed 500 ml container and keep at 60 ± 2°C for 96 hours.

Appendix `D'

Accelerated Weathering Test

D-1 **Outline of the Method**

The durability of the material is determined by ascertaining actual behaviour of suitably prepared test panels in an accelerated weathering test for a specified period and evaluating the results of the exposure by a suitable method of rating for various characteristics of the film of the material. The prepared test panels are subjected to controlled exposure of heat, light and water in the artificial weathering apparatus. (Xenon Arc Weatherometer).

D-2 **Test Panels**

The panel shall be mild steel plate, 1.25mm thick and free from surface defects, conforming to IS:513. Test panels shall be 145mm x 65mm in size. The panels shall be cleaned as prescribed in IS:101(Part 1 - Sec.3) and the edges of the panels shall be protected with two coats of a primer/gelling.

D-3 Preparation of Test Panels

3.1 The test panels at every stage of preparation shall be air dried at 25 to 30°C and relative humidity of 60 to 70 percent.

3.2 The surface of the test panels to be exposed shall be prepared as follows, taking care that total dry film thickness of the complete system shall be between 75 and 100 microns.

a) Apply one coat of ready mixed paint Red Oxide-zinc chrome primer (IS:2074) by brushing/dipping and allow to air dry for 24 Hrs.

b) Rub down lightly with water-proof emery paper No. 280/320, wipe off the surface using a piece of clean and dry soft cloth and then apply by brushing/dipping one coat of the undercoating enamel and allow to air dry for 24 Hrs.

c) Rub down, wet, with waterproof emery paper No. 320, wipe off the surface using a piece of clean and dry soft cloth and then apply by brushing/dipping one coat of the finishing enamel and allow to air-dry for 48 Hrs.

d) Rub down, wet, with waterproof emery paper No. 320, wash and wipe off water and when the surface is dry, apply by brushing/dipping a second coat of the finishing enamel and allow to air-dry for 7 days before subjecting to exposure test.

Note: The primer and undercoat required for the preparation of test panels for finishing enamel shall be supplied by the manufacturer of finishing enamel. In case if these are not supplied, the panel shall be prepared by using primer and undercoat of some reputed make, meeting the requirements of IS 2074 and AS:254 or using the multiple coats of the sample under test, itself.

D-4 Accelerated Weathering Test

4.1 Accelerated Weathering Apparatus

An artificial weathering apparatus of Xenon Arc type for uniform and controlled exposure, to effect of heat, light and water.

4.2 Procedure

The panels for this test prepared as described above, shall be tested for 15 days (360 hrs) and examined at the end of the period for various characteristics described in Table 2.

4.2.1 **Test Conditions**

Operate the Xenon Arc Weather-O-Meter with automatic control for maintaining following test conditions.

Filter combination : Inner: Type S Boro Silicate
Outer: Type S Boro Silicate
Irradiance : 0.55 W/m^2 at 340 nm during light hours

Operate the apparatus with automatic control of light & dark cycle as mentioned below segments:

Light Cycle Setting:

Irradiance	0.55 W/m2
Black Panel Testing	70°C
Chamber Temperature	47°C
Relative Humidity	50%

Dark Cycle Setting:

Chamber Temperature	38°C
Relative Humidity	95%

	Segment 1	Segment 2	Segment 3	Segment 4
Cycle	Dark	Light	Light	Light
Duration	60 min.	40 min.	20 min.	60 min.
Specimen Spray	On	Off	On	Off
Rack Spray	On	Off	Off	Off

D-5 **Evaluation and Rating of film characteristics of Test Panel**

The test panels before, during and after the test shall be assessed for the various film characteristics as detailed in table 2 of the Appendix D. The test panel shall be compared against intact (initial) panel considering initial rating 10.

Rating of paint film characteristics after accelerated weathering test
TABLE - 2

Sr. No.	Characteristics	Requirements
1	Gloss retention at 60°, Min.	70% of original value
2	Colour change, Rating, Min.	8
3	Freedom from checking, Minimum rating	8
4	Freedom from cracking, Minimum rating	8
5	Freedom from flaking, Minimum rating	8
6	Freedom from chalking, Minimum rating	8
7	Freedom from spotting, Minimum rating	8
8	Freedom from blistering and corrosion, Minimum rating	8

WEIGHTAGE MARKS FOR ENAMEL, SYNTHETIC, EXTERIOR, AIR DRYING GLOSSY AND MATT FINISH, AIR DRYING (PREMIUM QUALITY)

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Sr. No	Test Parameter	Clause No.	Marks Allotted	P/T
1.	Mass in Kg per 10 Litres, Min.	6.5 Table.1(1)	4	P
2.	Volume Solids, Min.	6.5 Table.1(2)	4	P
3.	Flash point, Min.	6.5 Table.1(3)	4	P
4.	Drying time	6.5 Table.1(4)		
	a) Surface dry	6.5Table.1(4,a)	2	P
	b) Hard dry	6.5Table.1(4,b)	2	P
	c) Tack free	6.5Table.1(4,c)	2	T
5.	Colour	6.5 Table.1(5)	4	T
6.	a) Finish	6.5Table.1(6,a)	4	T
	b) Gloss at 60°, Min.	6.5Table.1(6,b)	6	P
7.	Scratch Hardness after 48 hrs. air drying	6.5Table.1(7)	6	T
8.	Flexibility and Adhesion	6.5Table.1(8)	4	T
9.	Resistance to Diesel	6.5Table.1(9)	4	T
10.	Resistance to Corrosion	6.5Table.1(10)	4	T
11.	Resistance to Acid	6.5Table.1(11)	4	T
12.	Resistance to Alkali	6.5Table.1(12)	4	T
13.	Accelerated Storage Stability Test	6.5Table.1(13)	4	T
14.	Accelerated Weathering Test	6.5Table.1(14) & Appendix ’D’		
i	Gloss retention at 60°, Min.	“	10	P
ii	Colour rating, Min.	“	10	P
iii	Freedom from checking	“	3	P
iv	Freedom from cracking	“	3	P
v	Freedom from flaking	“	3	P
vi	Freedom from chalking	“	3	P
vii	Freedom from spotting	“	3	P
viii	Freedom from blistering & corrosion	“	3	P
		Total	**100**	

P = Proportionate marks shall be considered.
T = Total marks shall be considered.